SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Mechanical Engineering **Academic Year: 2022** **Duration: 3 hours**
Date: 14.01.2023
Time: 10:30 am to 01:30 pm
Subject: Renewable Energy Systems (Semester V) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

(1) This question paper consists of two pages
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Q1 (a) Define Non-renewable sources of energy. Also, discuss different Renewable sources of energy with current status in India. [08]

OR

i. Classify different Renewable and non-renewable energy sources. [04]
ii. What is MNRE scheme? What is MNRE approval? [04]

Q1 (b) Explain Hybrid Energy Systems any one with neat sketch. [07]

Q2 (a) Describe a Solar Flat plate collectors with neat sketch. [08]

OR

Explain the working principle of solar pond with neat sketch. [08]

Q2 (b) Calculate the angle made by beam radiation with the normal to a flat plate collector, pointing the south location in New Delhi (27° 30'N, 76° 42'E) at 10.00 hour solar time on October 29. The collector is tilted at an angle of 35° with the horizontal. Also calculate the day-length. [07]

Q3 (a) How wind energy conversion (WEC) systems are classified? Discuss in brief. [07]

OR

Describe the main considerations in selecting a site for wind mill. [07]

Q3 (b) Following data relate to a propeller turbine. Velocity of wind at ~~200~~ 20°C = 20m/s. (At atmospheric pressure) Turbine diameter =12 m and Operating speed of the turbine = 45 rpm at maximum efficiency. [08]

Calculate

i) Total power density in the wind Stream
ii) Maximum obtainable power density

iii) Reasonably obtainable power density
iv) Total power generated
v) Maximum torque and maximum axial thrust

Q4 (a) Explain any two methods used in production of Hydrogen? [08]

OR

What is biogas plant? What are the problems encountered in its operation? [08]

Q4 (b) Discuss Anaerobic Digestion System (Biogas Technology) with its Advantages and Disadvantages. [07]

Q5 Write short note on any **THREE.**

i) Geo-pressured system [05]
ii) Petro-thermal Systems or Hot Dry Rocks (HDR) Resources [05]
iii) Single-Basin Tidal Plants [05]
iv) Ocean Thermal Energy Conversion (OTEC) [05]

Best Wishes!